

Harnessing Artificial Intelligence for Early Detection and Management of Infectious Disease Outbreaks

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Abstract : Infectious diseases continue to pose significant threats to global public health, necessitating advanced and timely detection methods for effective outbreak management. This study explores the integration of artificial intelligence (AI) in the early detection and management of infectious disease outbreaks. Leveraging vast datasets from diverse sources, including electronic health records, social media, and environmental monitoring, AI-driven algorithms are employed to analyze patterns and anomalies indicative of potential outbreaks. Machine learning models, trained on historical data and continuously updated with real-time information, contribute to the identification of emerging threats. The implementation of AI extends beyond detection, encompassing predictive analytics for disease spread and severity assessment. Furthermore, the paper discusses the role of AI in predictive modeling, enabling public health officials to anticipate the spread of infectious diseases and allocate resources proactively. Machine learning algorithms can analyze historical data, climatic conditions, and human mobility patterns to predict potential hotspots and optimize intervention strategies. The study evaluates the current landscape of AI applications in infectious disease surveillance and proposes a comprehensive framework for their integration into existing public health infrastructures. The implementation of an AI-driven early detection system requires collaboration between public health agencies, healthcare providers, and technology experts. Ethical considerations, privacy protection, and data security are paramount in developing a framework that balances the benefits of AI with the protection of individual rights. The synergistic collaboration between AI technologies and traditional epidemiological methods is emphasized, highlighting the potential to enhance a nation's ability to detect, respond to, and manage infectious disease outbreaks in a proactive and data-driven manner. The findings of this research underscore the transformative impact of harnessing AI for early detection and management, offering a promising avenue for strengthening the resilience of public health systems in the face of evolving infectious disease challenges. This paper advocates for the integration of artificial intelligence into the existing public health infrastructure for early detection and management of infectious disease outbreaks. The proposed AI-driven system has the potential to revolutionize the way we approach infectious disease surveillance, providing a more proactive and effective response to safeguard public health.

Keywords : artificial intelligence, early detection, disease surveillance, infectious diseases, outbreak management

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